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Natalia Herrera, Asier M. Salaberria, Aji P. Mathew, Kristiina Oksman

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**Plasticized polylactic acid nanocomposite films with cellulose and chitin nanocrystals prepared using extrusion and compression molding with two cooling rates: effects on mechanical, thermal and optical properties**

Natalia Herrera<sup>a</sup>, Asier M. Salaberria<sup>b</sup>, Aji P. Mathew<sup>a</sup> and Kristiina Oksman<sup>a,c,\*</sup>

<sup>a</sup>*Division of Materials Science, Composite Center Sweden, Luleå University of Technology, 971 87 Luleå-Sweden;* <sup>b</sup>*Biorefinery Processes Research Group, Department of Chemical and Environmental Engineering, Polytechnic School, University of the Basque Country, Plaza Europa 1, 20018 Donostia-San Sebastian, Spain;* <sup>c</sup>*Fibre and Particle Engineering, University of Oulu, FI-90014 Oulu-Finland*

\*Correspondence to: Kristiina Oksman. Tel.: +46 920 49 3371.  
E-mail address: [Kristiina.oksman@ltu.se](mailto:Kristiina.oksman@ltu.se)

**Abstract**

Triacetate citrate plasticized poly lactic acid and its nanocomposites based on cellulose nanocrystals (CNC) and chitin nanocrystals (ChNC) were prepared using a twin-screw extruder. The materials were compression molded to films using two different cooling rates. The cooling rates and the addition of nanocrystals (1 wt%) had an impact on the crystallinity as well as the optical, thermal and mechanical properties of the films. The fast cooling resulted in more amorphous materials, increased transparency and elongation to break, (approx. 300%) when compared with slow cooling. Chitin nanocomposites were more transparent than cellulose nanocomposites; however, microscopy study showed presence of agglomerations in both materials. The mechanical properties of the plasticized PLA were improved with the addition of a small amount of nanocrystals resulting in PLA nanocomposites, which will be further evaluated for film blowing and thus packaging applications.

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